Remarks

In the outstanding Office Action, claim 43 was rejected under 35 U.S.C. § 112 and 35 U.S.C. § 101. In addition, claims 19-21, 24-43, and 45 were provisionally rejected under the judicially-created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of copending U.S. Application No. 10/461,307. Further, claims 19, 24-43, and 45 were rejected under 35 U.S.C. § 102(e), and claims 20 and 21 were rejected under 35 U.S.C. § 103(a).

In response, Applicant amends claims 19 and 20 and cancels claims 21 and 43. Claims 19, 20, 24-42, and 45 are pending. No new matter has been added by the amendments. In view of the amendments and the following remarks, Applicant respectfully requests reconsideration and allowance of the pending claims.

Amendments to the Specification

Due to a clerical error, the Specification, as originally filed, incorrectly claimed priority directly to U.S. Provisional Patent Application No. 60/191,663. To be sure, Applicant clearly intended to claim the benefit of the filing date of U.S. Provisional Patent Application No. 60/191,663 and has amended the Specification to properly show the chain of priority back to U.S. Provisional Patent Application No. 60/191,663. Applicant is not changing priority but is merely correcting the clerical error.

Double Patenting Rejections

Claims 19, 20, 24-42, and 45 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of copending U.S. Application No. 10/461,307 ("'307 Application"). While Applicant disagrees that the currently pending claims are obvious over those of the '307 Application, in order to expedite allowance of the present application, Applicant will consider a terminal disclaimer if necessary and appropriate when there is an indication of otherwise allowable subject matter.

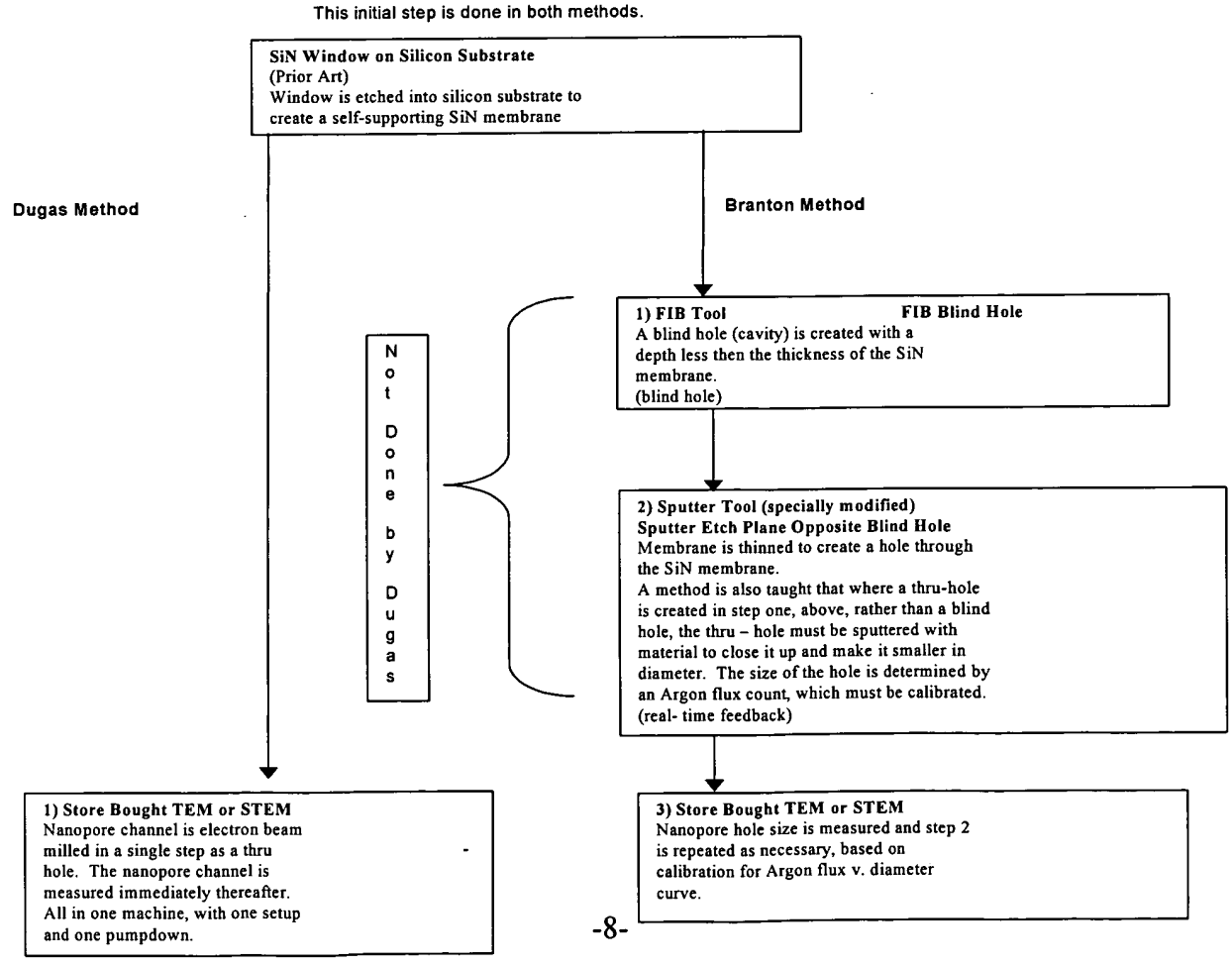
§ 102(e) Rejections

Claims 19, 24-42, and 45 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,627,067 ("Branton"). Applicant respectfully traverses the rejection for at least the following reasons.

Claim 19 Is Not Anticipated by Branton

Claim 19, as amended, is directed to a method of forming a membrane structure for use in a device to characterize polymer molecules. The method comprises, in part, "electron beam milling a nano-scale channel entirely through a self supporting portion of the thin film; and measuring the channel in-situ, wherein the drilling and measuring are performed during a single presentation to an instrument."

In contrast, Branton does not disclose the invention of claim 19. Rather, Branton discloses microfabrication of an aperture in a solid-state membrane that requires more than a single presentation to a single instrument. Furthermore, Branton fails to disclose measuring the channel in-situ. The diagram below and the following remarks detail the method that is disclosed in Branton.



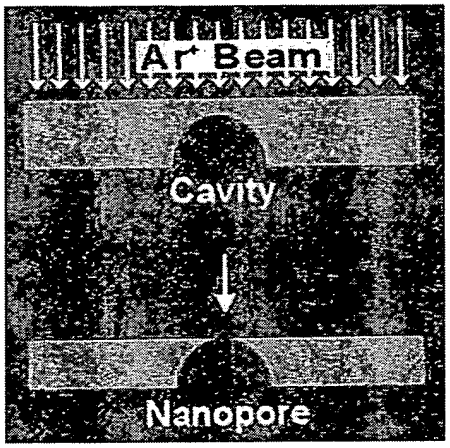
To create the aperture using the Branton method, *each* of the following steps is required. First, shown as step "1" on the Branton side of the diagram above, a cavity is etched in the membrane 134 as shown in Fig. 4G. *See* Branton, col. 13, ll. 3-5. This cavity is a "blind hole." That is, the cavity does not breach both sides of the membrane 134. In fact, the cavity terminates "at an interior point in the membrane." *Id.* col. 13, ll. 45-46; Fig. 4G. Furthermore, the dimensions of the cavity created can be, and are designed to be, much larger than the final diameter of the aperture. *Id.* col. 13, ll. 42-45. This cavity-forming step is performed with a lithographic instrument. *Id.* at col. 13, ll. 5-18.

Second, after the cavity has been lithographically etched partially through the membrane 134, the membrane is "thinned" until an aperture, or thru-hole, is formed. *Id.* at col. 13, l. 56 - col. 14, l. 13. In fact, "the aperture formation process of the invention relies on structural thinning, rather than lithography, to define the final aperture geometry." *Id.* at col. 13, ll. 38-40. The step of structural thinning is required in the Branton method because the cavity created in the first step of Branton has too large a diameter. Thus, both the cavity creation step and the thinning step are required to create a "nano-scale channel *entirely* through a self-supporting portion of the thin film." That is, the thinning step requires a *second* presentation to a *second* vacuum instrument, as shown in step "2" on the Branton side of the above diagram. Branton alternatively teaches using an additive process, such as sputtering, to close up an aperture that is too large, which also requires a second presentation to a second vacuum instrument. *Id.* at col. 14, ll. 43-51; col. 27, ll. 46-50. Thus, Branton teaches an aperture-forming process that requires more than a single presentation to a single instrument. Branton does not disclose, therefore, "electron beam milling a nano-scale channel entirely through a self supporting portion of the thin film; and measuring the channel in-situ, wherein the drilling and measuring are performed *during a single presentation to an instrument.*"

Furthermore, the second step creates an aperture of unknown size, and the aperture must be measured, as shown in step "3" on the Branton side of the above diagram. This also requires a different presentation to a different instrument. As such, Branton does not disclose drilling and measuring "during a single presentation to an instrument."

Branton, furthermore, fails to disclose "measuring the channel in-situ." As mentioned by the Examiner, Branton discloses that a feedback mechanism may be implemented during the

thinning process. The feedback mechanism, however, is merely a mechanism used for obtaining an inferred, or indirect, estimation of the size of the aperture. "The feedback mechanism is based on detection of a physical species [such as Argon] provided during the thinning etch in a manner that is indicative of the physical dimensions of . . . an aperture." *Id.* col. 14, ll. 25-28. See the following the diagram for an illustration of the feedback mechanism.



Using the feedback mechanism disclosed in Branton, the amount of a physical species, e.g., Argon, pouring through the aperture, as it is widened by the thinning process, is detected. Once a certain amount of Argon is detected, the thinning process is caused to be halted. This is, in fact, *not* a measurement of the aperture, but merely an estimate of the size of the aperture. This method is not as accurate as measuring the channel in-situ. Furthermore, the feedback mechanism disclosed in Branton must be calibrated using direct measurements of the diameter of an aperture. Thus, Branton does not disclose "measuring the channel *in-situ*, wherein the drilling and measuring are performed during a single presentation to an instrument."

For at least the above reasons, Branton fails to teach or suggest, "electron beam milling a nano-scale channel entirely through a self supporting portion of the thin film; and measuring the channel in-situ, wherein the drilling and measuring are performed during a single presentation to an instrument." Thus, Branton fails to teach or suggest the invention of claim 19. Reconsideration and withdrawal of the rejection is respectfully requested.

Claims Depending from Claim 19 Are Patentable

Because claims 24-42 and 45 depend directly or indirectly from claim 19 and incorporate all the limitations of claim 19, the above argument obviates the basis for this ground of rejection. Thus, claims 24-42 and 45 are not anticipated by Branton. Reconsideration and withdrawal of the rejection is respectfully requested.

§ 103(a) Rejections

Claim 20 was rejected under 35 U.S.C. 103(a) as being unpatentable over Branton in view of U.S. Patent 6,218,663 ("Nisch"). Applicant respectfully traverses the rejection for at least the following reasons.

Claim 19 Is Not Made Obvious by Branton in View of Nisch

Claim 19, as explained above, is directed to a method that includes, in part, "electron beam milling a nano-scale channel entirely through a self supporting portion of the thin film; and measuring the channel in-situ, wherein the drilling and measuring are performed during a single presentation to an instrument."

In contrast, Branton, as explained above, fails to teach or suggest the invention of claim 19. Instead, Branton discloses an aperture-forming process that requires more than a single presentation to an instrument. The first step in the Branton process is a cavity-forming step that is performed with a lithographic instrument. *See* Branton, col. 13, ll. 5-18. The second step is a thinning step that is performed by any of several processes except lithography. *Id.* at col. 13, ll. 38-40. A second presentation to a second instrument is required. Furthermore, Branton discloses a feedback mechanism that merely provides an estimate of the aperture diameter and not a measurement of the aperture itself. Thus, Branton fails to teach or suggest "electron beam milling a nano-scale channel entirely through a self supporting portion of the thin film; and measuring the channel in-situ, wherein the drilling and measuring are performed during a single presentation to an instrument."

Nisch fails to remedy the deficiencies of Branton. As noted in the Office Action, Nisch teaches ion etching for local thinning of a sample. *See* Nisch, Abstract. The purpose of Nisch is to "carry out target preparations under high-resolution observing conditions and to eliminate contaminant or reactive layers," such as an oxide layer. *Id.*, Abstract. Thus, Nisch, at most, discloses one method of performing the second step – the thinning step – of the Branton method.

In fact, Branton teaches that the thinning step can be performed by various ion beam methods. *See* Branton, col. 14, ll. 14-16. Such a combination of Branton and Nisch thus results in an aperture-forming method that still requires more than a "single presentation to an instrument." Additionally, nothing in Branton or Nisch teaches or suggests modifying Branton's process such that it is performed during a single presentation to an instrument.

Thus, neither Branton nor Nisch, alone or in combination, teach or suggest "electron beam milling a nano-scale channel entirely through a self supporting portion of the thin film; and measuring the channel in-situ, wherein the drilling and measuring are performed during a single presentation to an instrument" as recited in Applicant's claim 19. Claim 19 is, therefore, not made obvious by Branton in view of Nisch.

Claim 20 is Not Made Obvious by Branton in View of Nisch

Because claim 20 depends directly from claim 19 and incorporates all the limitations of claim 19, the above arguments obviate the basis for this ground of rejection. Thus, claim 20 is not made obvious by Branton in view of Nisch. Reconsideration and withdrawal of the rejection is respectfully requested.

Conclusion

This application now stands in allowable form and reconsideration and allowance is respectfully requested.

No additional claim fees should be generated by this paper. However, the Commissioner is hereby authorized to charge any fee deficiency associated with this paper to Deposit Account No. 04-1420.

Respectfully submitted,

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